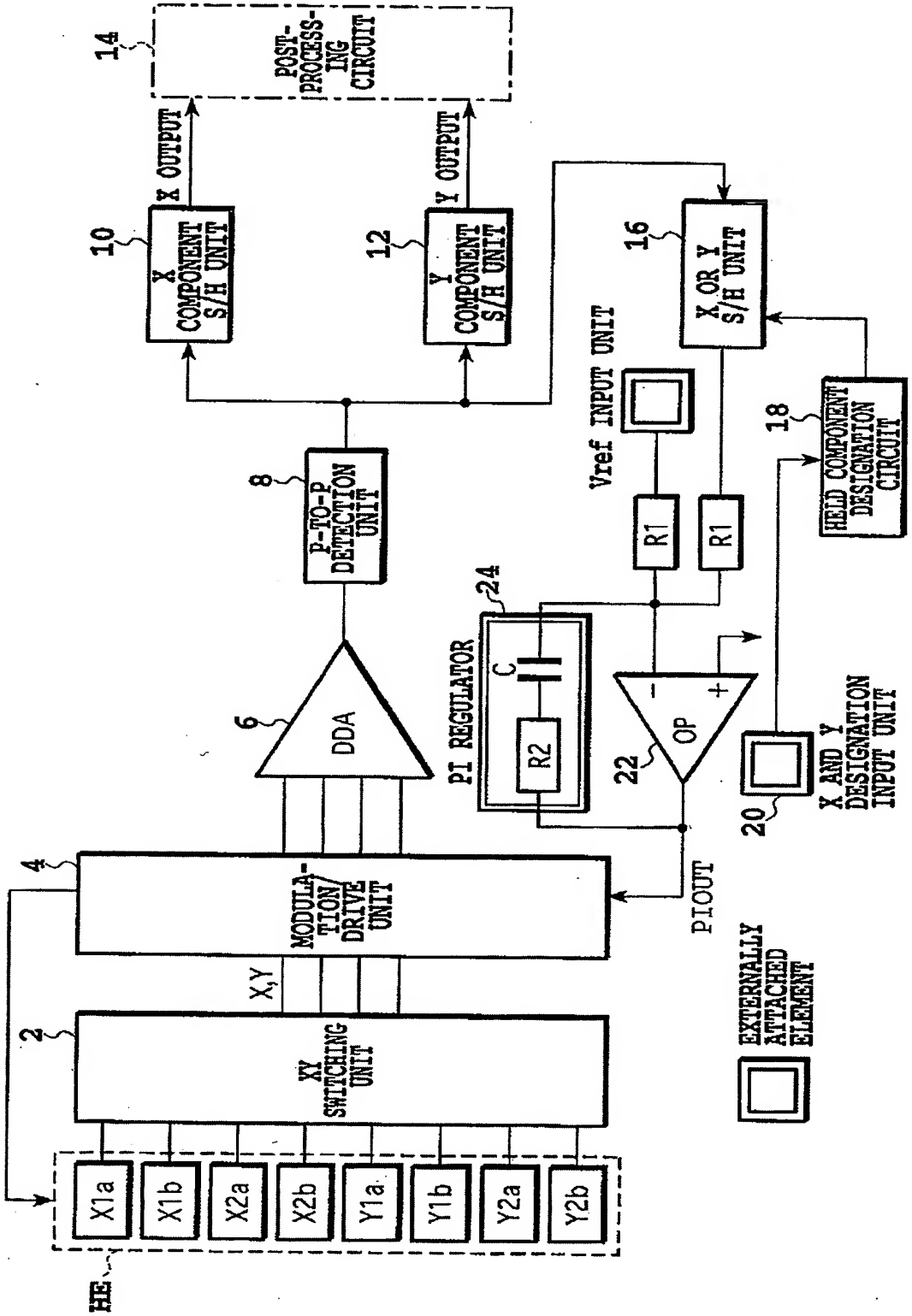

14
POST-PROCESSING CIRCUIT
X OUTPUT
Y OUTPUT
10
X COMPONENT S/H UNIT
12
Y COMPONENT S/H UNIT
16
X OR Y S/H UNIT
Vref INPUT UNIT
18
HELD COMPONENT DESIGNATION CIRCUIT
8
P-TO-P DETECTION UNIT
R1
R1
24
PI REGULATOR
C
R2
6
DDA
22
OP
20
X AND Y DESIGNATION INPUT UNIT
4
MODULATION/DRIVE UNIT
PIOUT
X,Y
2
XY SWITCHING UNIT
EXTERNALLY ATTACHED ELEMENT
X1a
X1b
X2a
X2b
Y1a
Y1b
Y2a
Y2b
HE

FIG.1

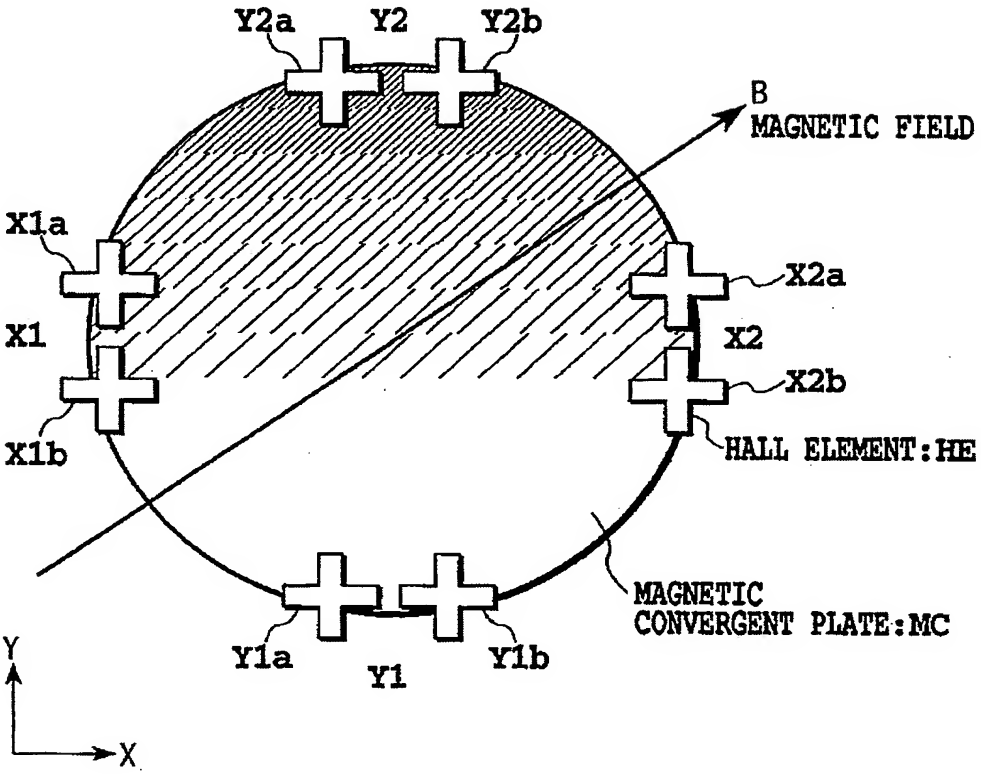

Y2a
Y2
Y2b
B
MAGNETIC FIELD
X1a
X1
X1b
X2a
X2
X2b
HALL ELEMENT:HE
MAGNETIC CONVERGENT PLATE:MC
Y1a
Y1
Y1b
Y
X

FIG.2

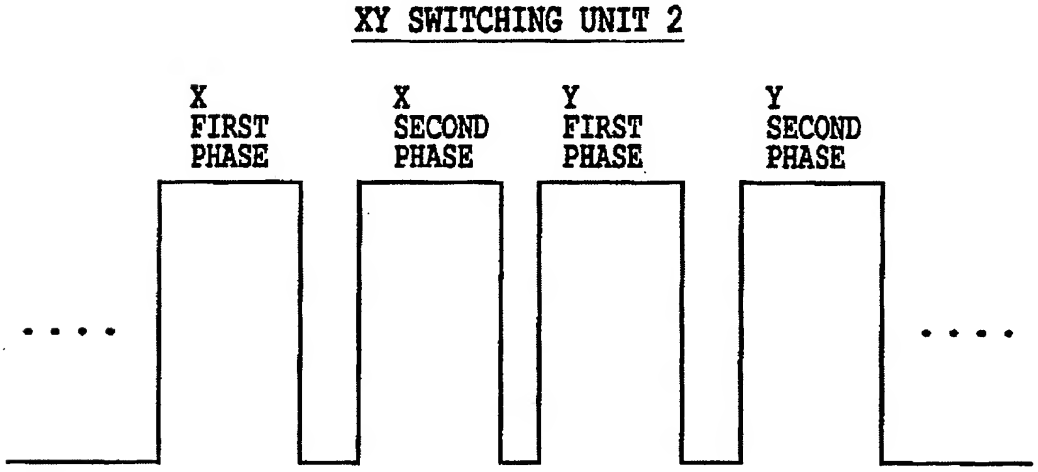
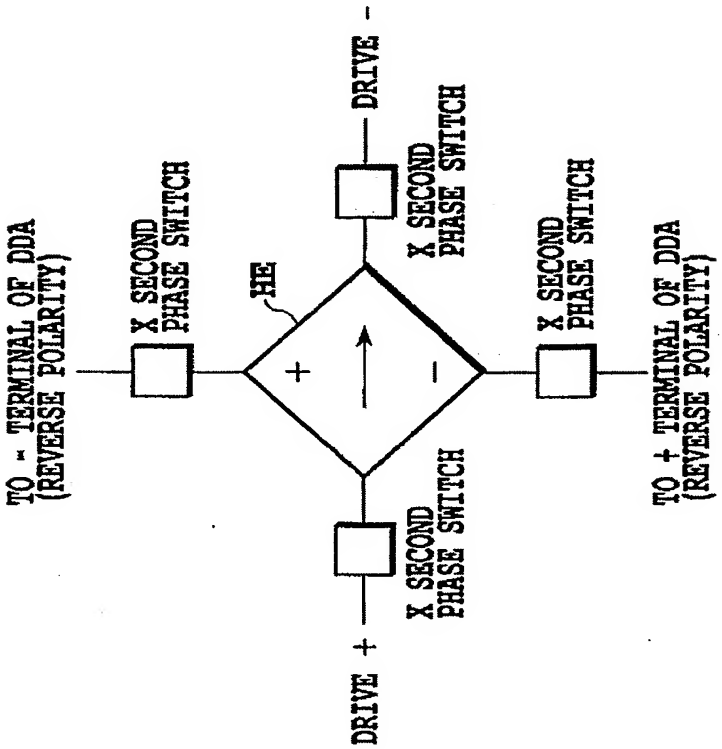

XY SWITCHING UNIT 2
X FIRST PHASE
X SECOND PHASE
Y FIRST PHASE
Y SECOND PHASE

FIG.3


TO - TERMINAL OF DDA (REVERSE POLARITY)
X SECOND PHASE SWITCH
HE
DRIVE -
X SECOND PHASE SWITCH
X SECOND PHASE SWITCH
TO + TERMINAL OF DDA (REVERSE POLARITY)
X SECOND PHASE SWITCH
DRIVE +

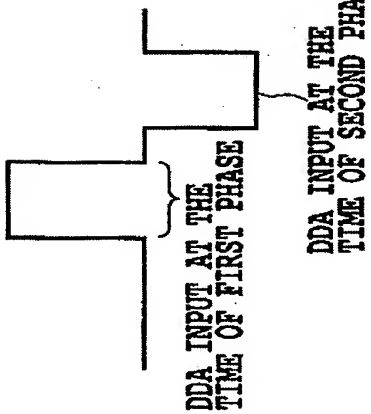
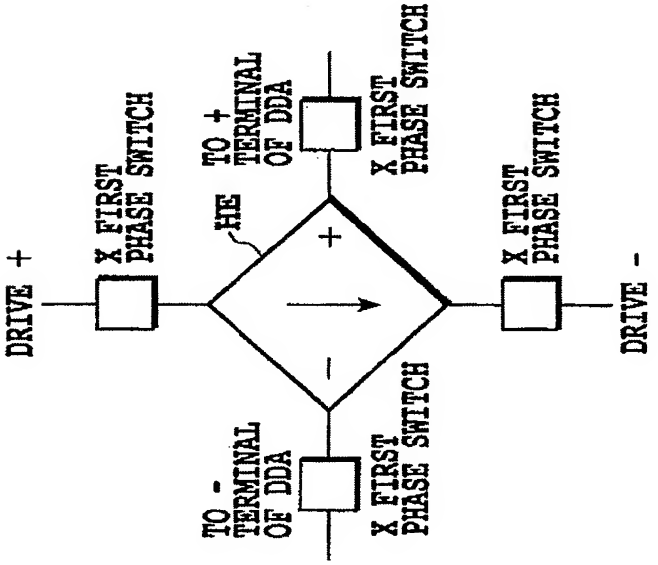

DDA INPUT AT THE TIME OF FIRST PHASE
DDA INPUT AT THE TIME OF SECOND PHASE

FIG.4B


DRIVE +
X FIRST PHASE SWITCH
HE
TO + TERMINAL OF DDA
X FIRST PHASE SWITCH
X FIRST PHASE SWITCH
DRIVE -
TO - TERMINAL OF DDA
X FIRST PHASE SWITCH

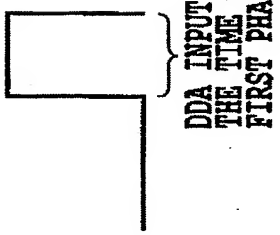

DDA INPUT AT THE TIME OF FIRST PHASE

FIG.4A

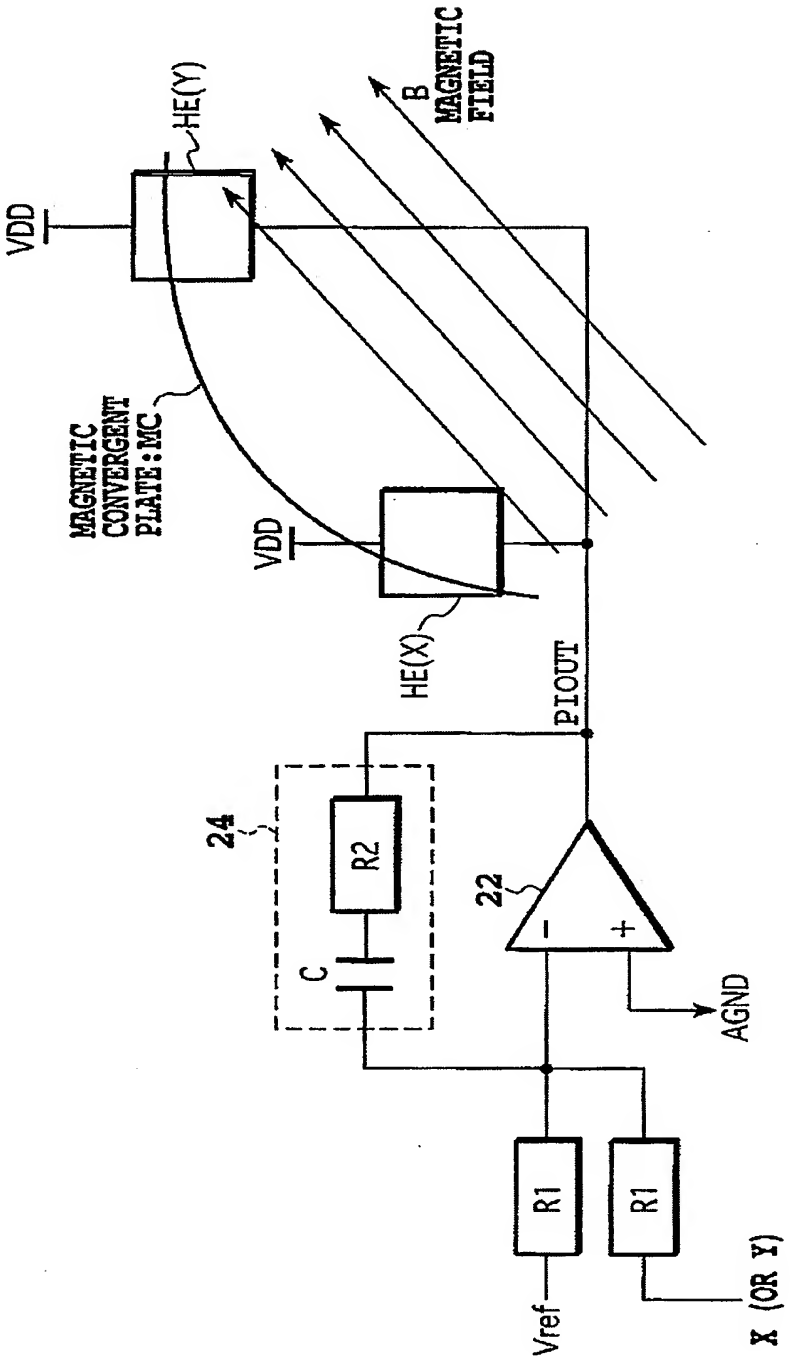

B
MAGNETIC FIELD
HE(Y)
VDD
MAGNETIC CONVERGENT PLATE:MC
VDD
HE(X)
PIOUT
24
R2
C
22
AGND
R1
R1
Vref
X (OR Y)

FIG.5

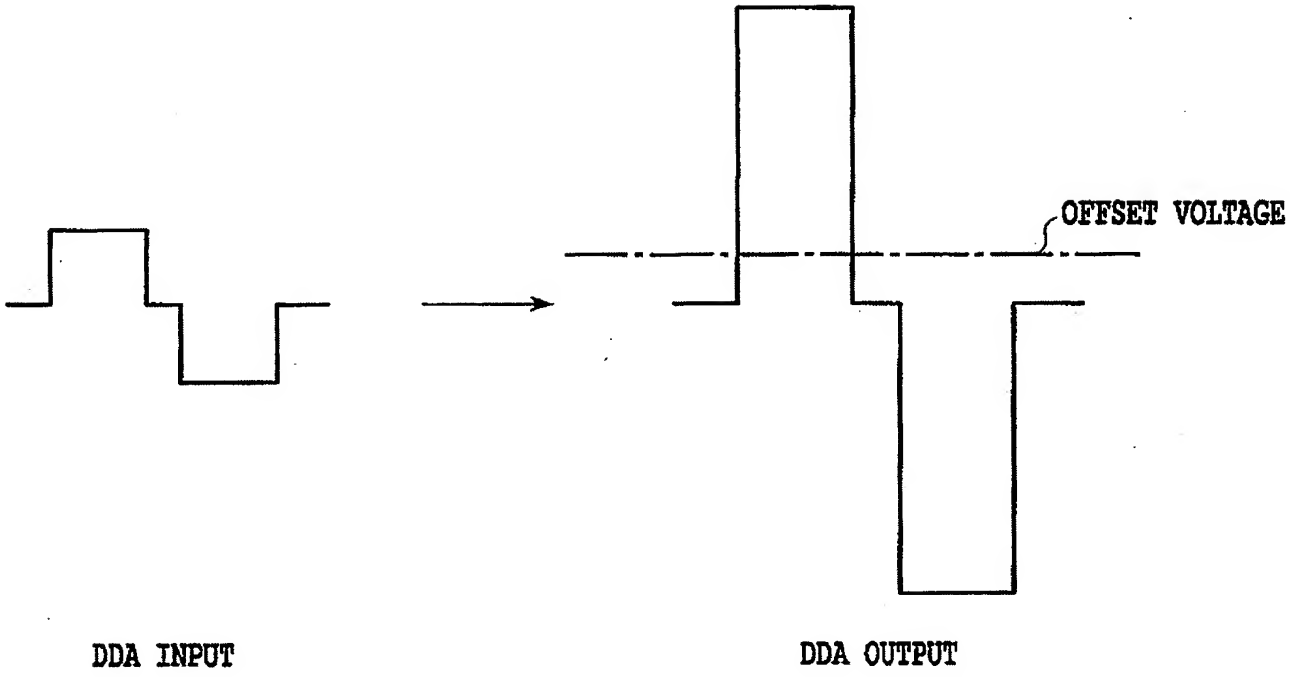

OFFSET VOLTAGE
DDA INPUT
DDA OUTPUT

FIG.6

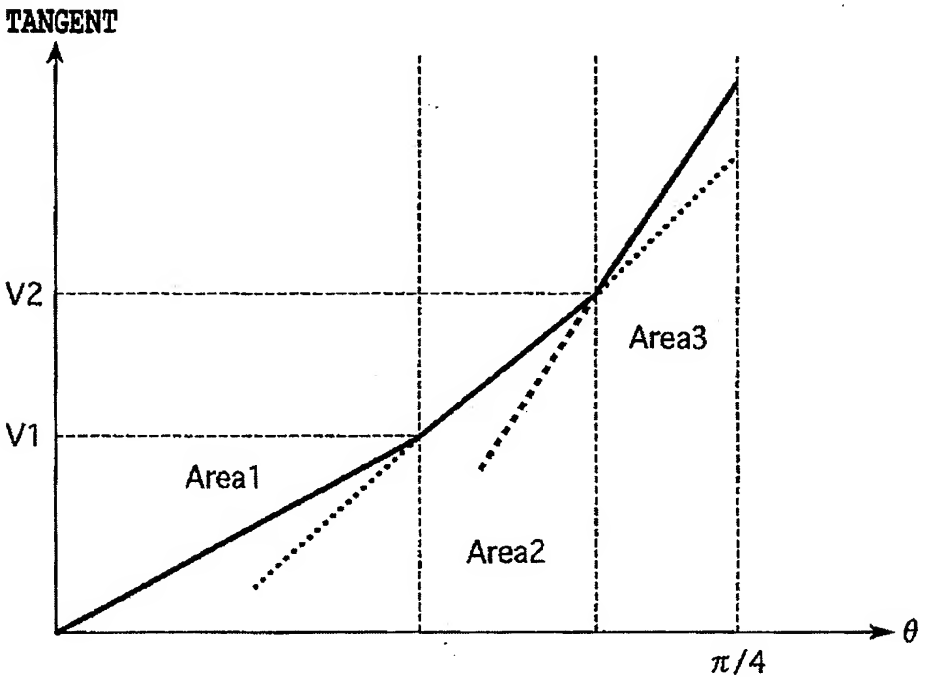

TANGENT
V2
V1
Area1
Area2
Area3
θ
π/4

FIG.12

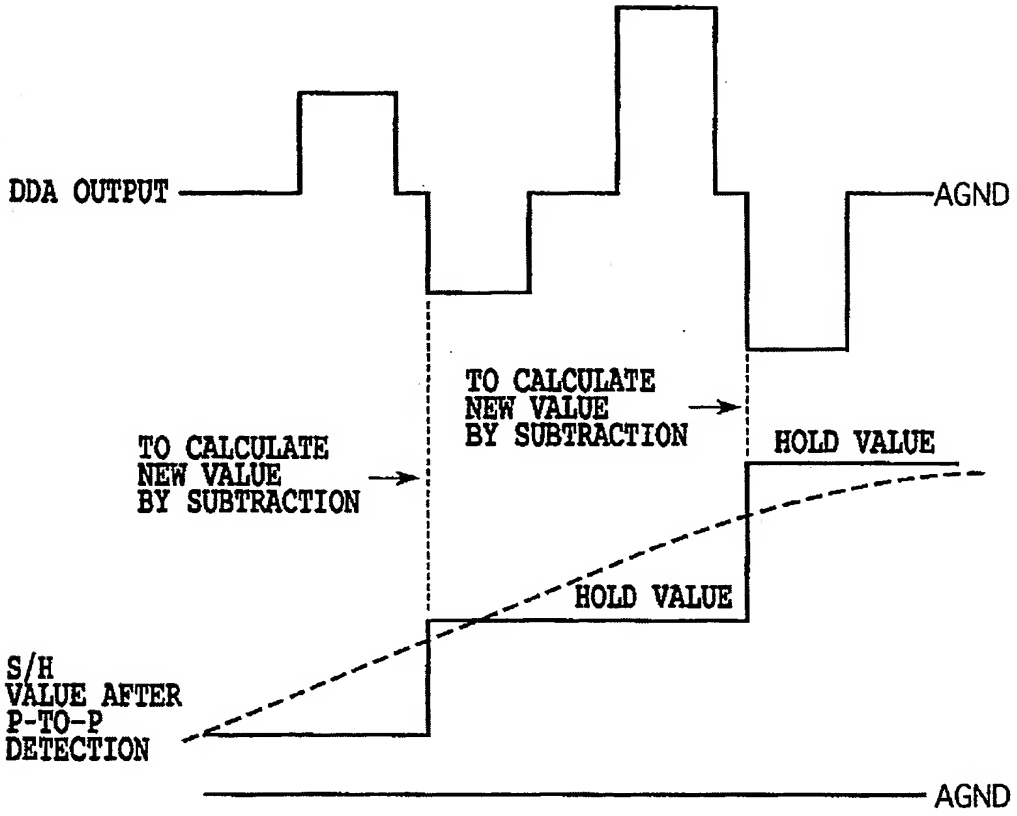

DDA OUTPUT
AGND
TO CALCULATE NEW VALUE BY SUBTRACTION
TO CALCULATE NEW VALUE BY SUBTRACTION
HOLD VALUE
HOLD VALUE
S/H VALUE AFTER P-TO-P DETECTION
AGND

FIG.7

DETECTION THEORY FOR TANGENT VALUE

There are two components (a+d) and (a-d)
If Y(a+d) + Y(a−d) is controlled to be constant,

For Y component

Vref = K I B{cos(a+d) + cos(a−d)}
Vref = 2KI Bcos(a) cos(d)
IB=Vref/cos(a)cos(d)2K

For X component

Out=X(a+d) + X(a−d) = K I B {sin(a+d) + sin(a−d)}
=2K I B sin(a) cos(d)
=Vref tan(a)

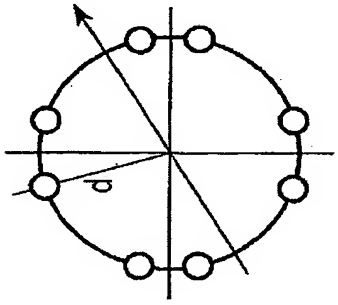


FIG.8

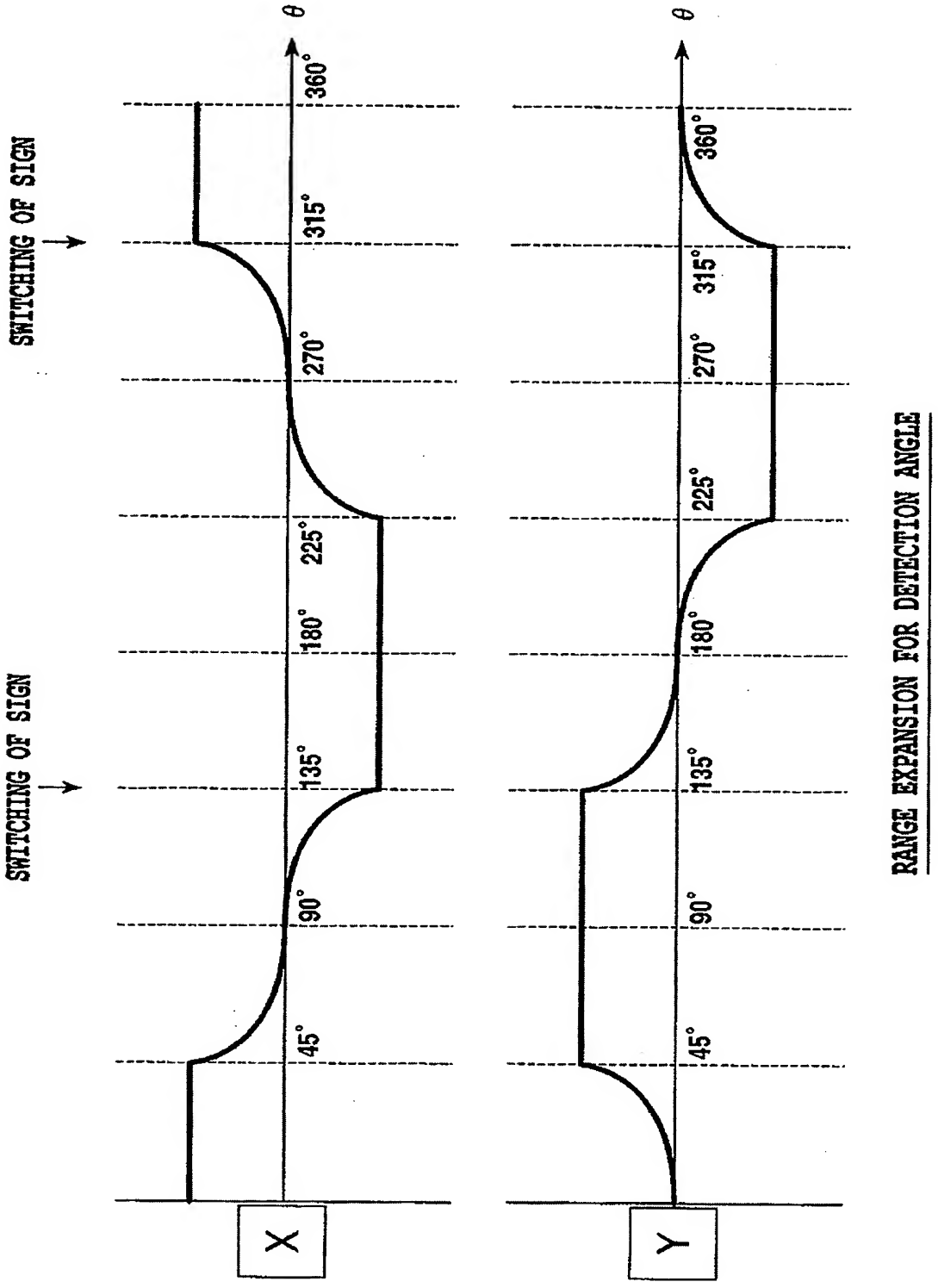
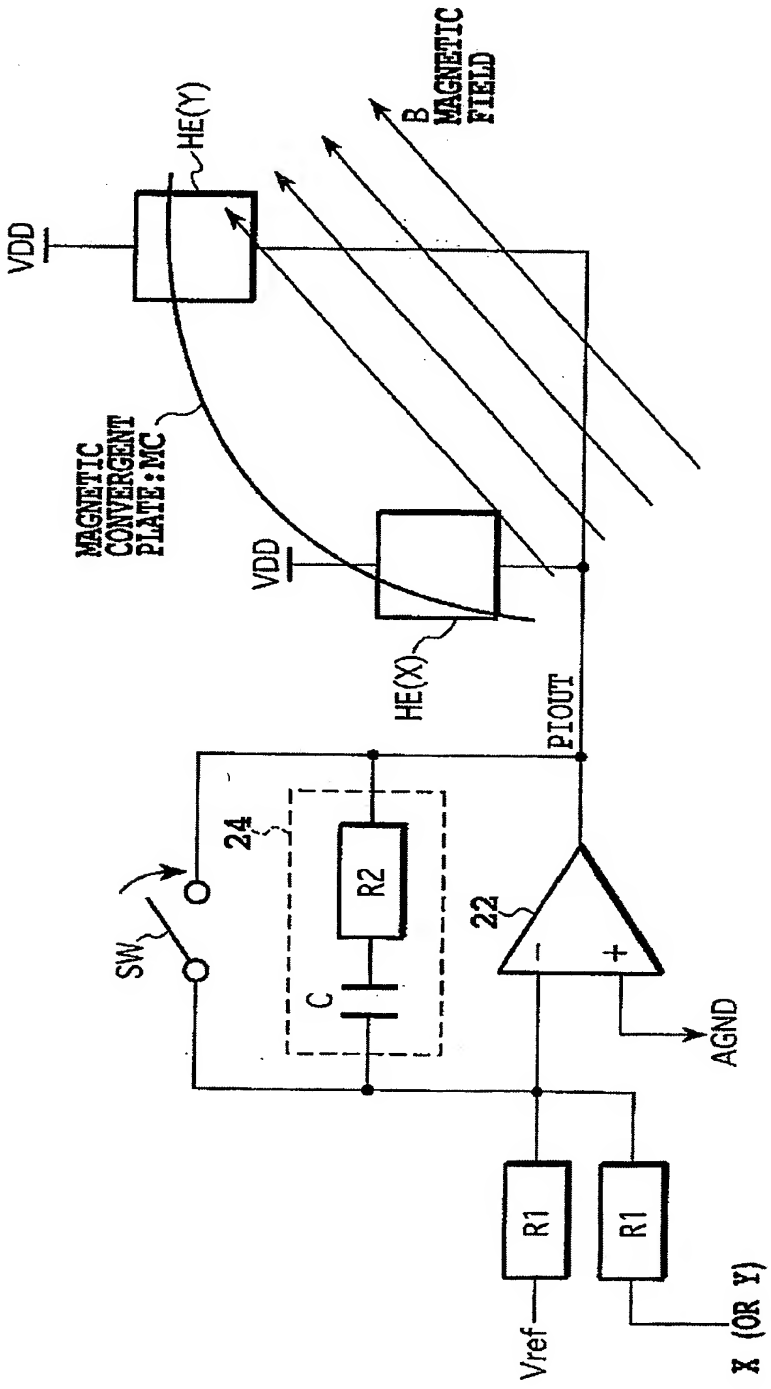

θ
360°
315°
270°
225°
180°
135°
90°
45°
SWITCHING OF SIGN
SWITCHING OF SIGN
X
Y
RANGE EXPANSION FOR DETECTION ANGLE

FIG.9



ANGLE AREA JUDGMENT AFTER POWER-ON

FIG.10

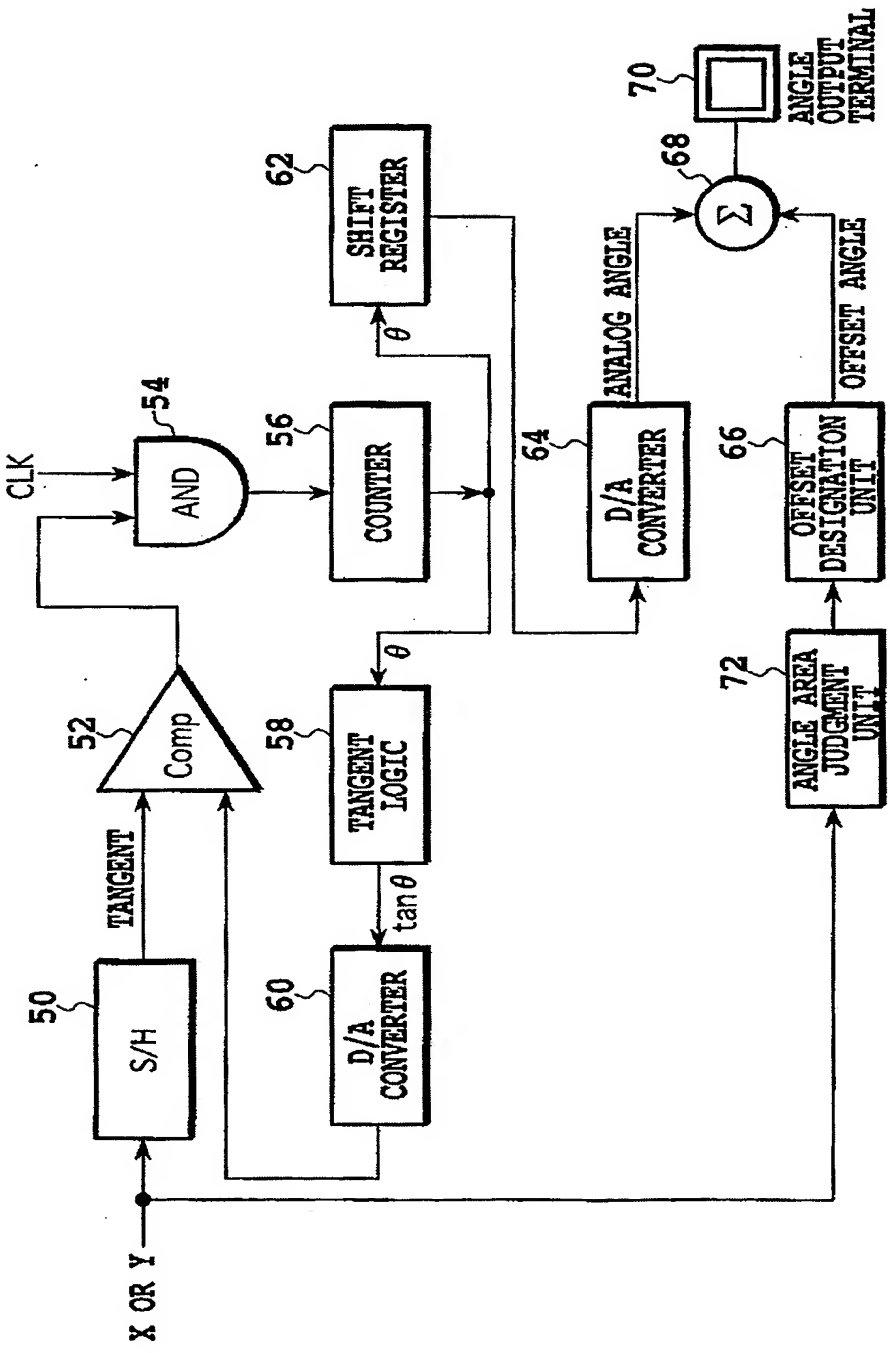

X OR Y
50
S/H
TANGENT
52
Comp
54
AND
CLK
56
COUNTER
58
TANGENT LOGIC
tan θ
60
D/A CONVERTER
θ
62
SHIFT REGISTER
θ
64
D/A CONVERTER
ANALOG ANGLE
66
OFFSET DESIGNATION UNIT
OFFSET ANGLE
68
Σ
70
ANGLE OUTPUT TERMINAL
72
ANGLE AREA JUDGMENT UNIT

FIG.11

FIG.13A

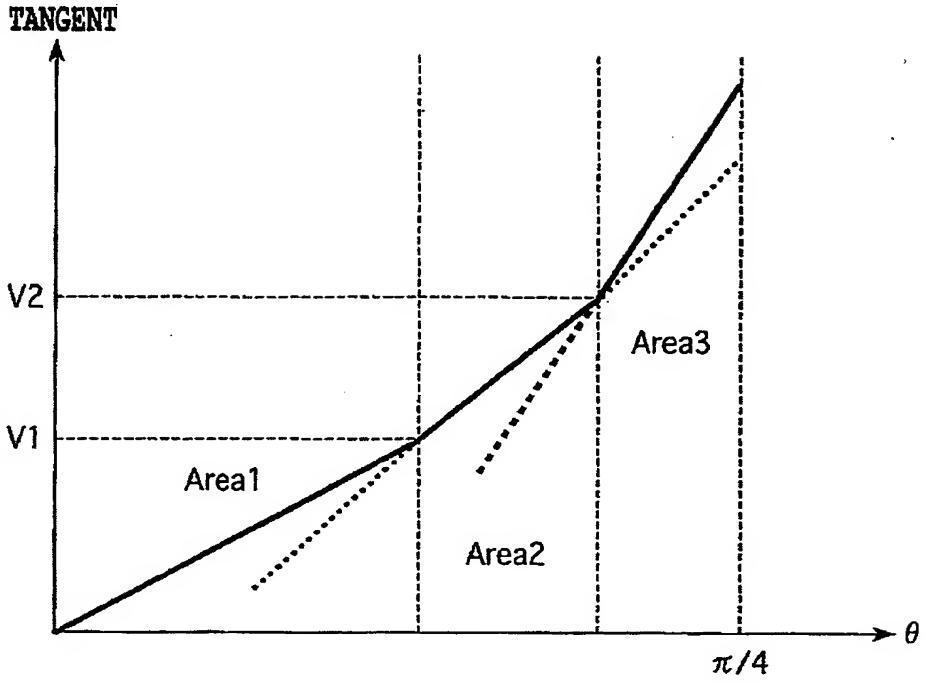
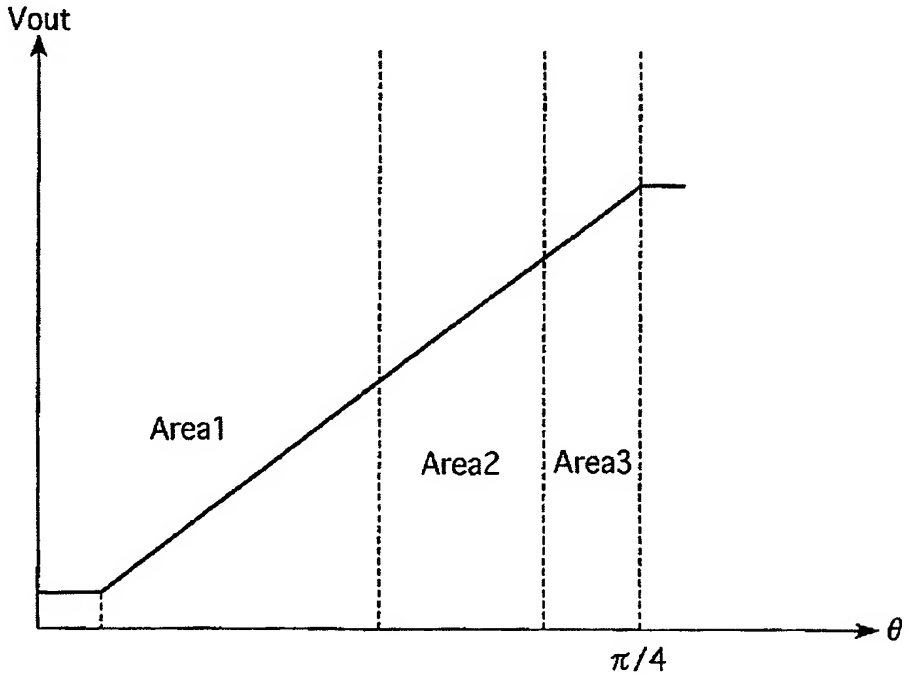


FIG.13B



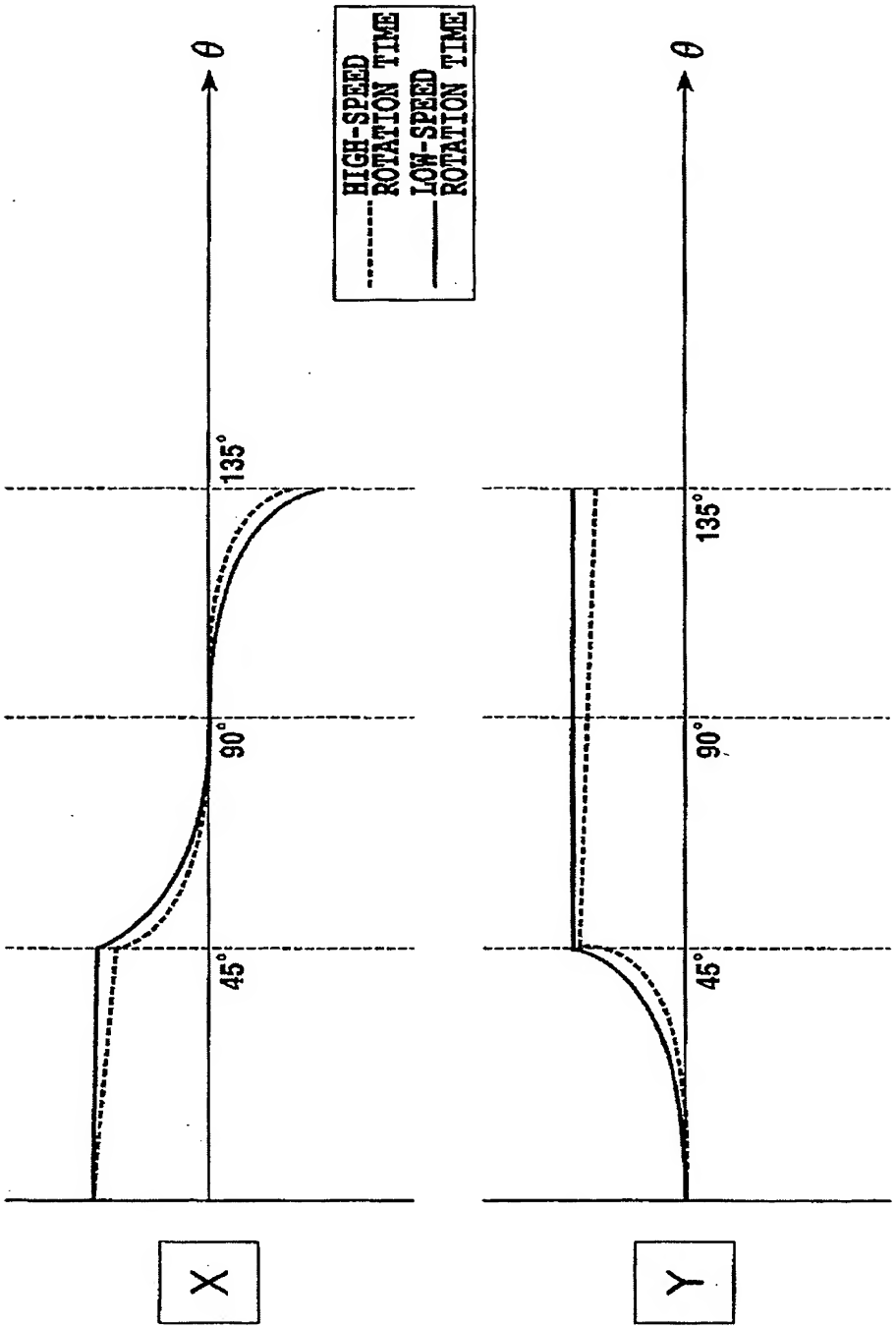

HIGH-SPEED ROTATION TIME
LOW-SPEED ROTATION TIME
θ
135°
90°
45°
X
θ
135°
90°
45°
Y

FIG.14

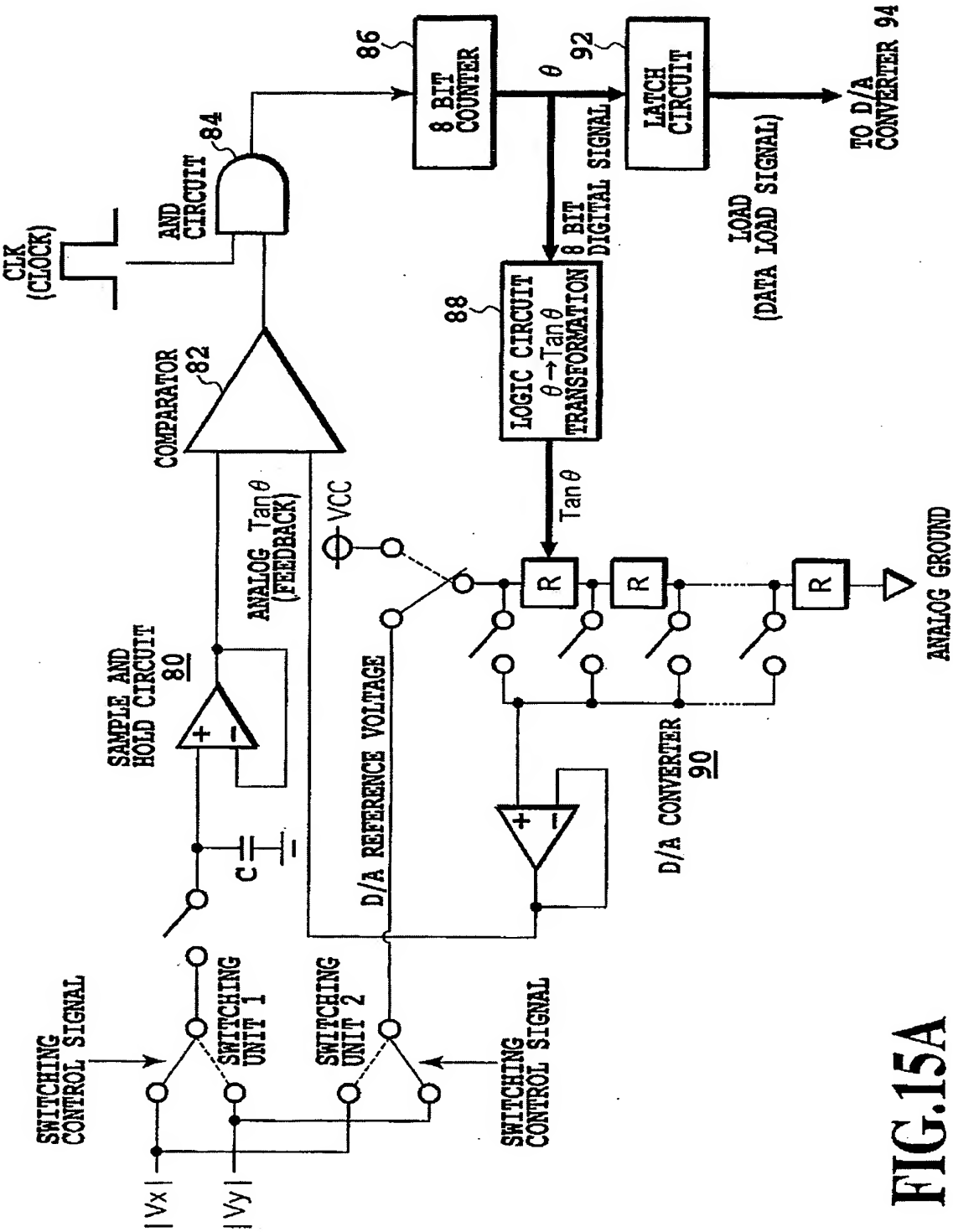

CLK (CLOCK)
AND CIRCUIT
84
86
8 BIT COUNTER
θ
92
LATCH CIRCUIT
TO D/A CONVERTER 94
8 BIT DIGITAL SIGNAL
LOAD (DATA LOAD SIGNAL)
88
LOGIC CIRCUIT θ→Tanθ TRANSFORMATION
COMPARATOR
82
ANALOG Tanθ (FEEDBACK)
Tanθ
VCC
R
R
R
ANALOG GROUND
SAMPLE AND HOLD CIRCUIT 80
C
D/A REFERENCE VOLTAGE
D/A CONVERTER 90
SWITCHING CONTROL SIGNAL
SWITCHING UNIT 1
SWITCHING UNIT 2
SWITCHING CONTROL SIGNAL
|Vx|
|Vy|

FIG.15A

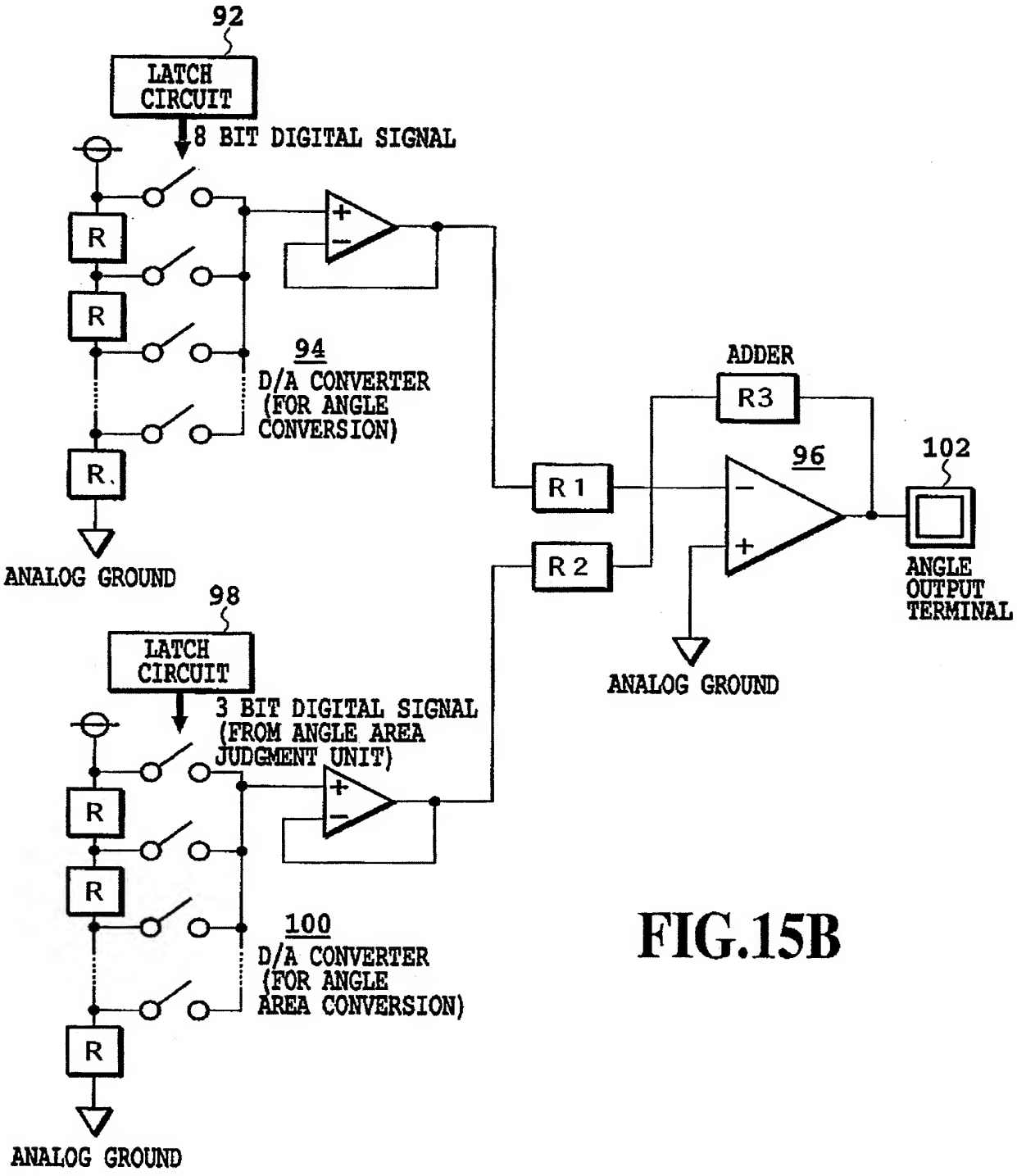

92
LATCH CIRCUIT
8 BIT DIGITAL SIGNAL
R
R
R
94
D/A CONVERTER (FOR ANGLE CONVERSION)
R
ANALOG GROUND
98
LATCH CIRCUIT
3 BIT DIGITAL SIGNAL (FROM ANGLE AREA JUDGMENT UNIT)
R
R
R
100
D/A CONVERTER (FOR ANGLE AREA CONVERSION)
R
ANALOG GROUND
ADDER
R3
96
R1
R2
102
ANGLE OUTPUT TERMINAL
ANALOG GROUND

FIG.15B

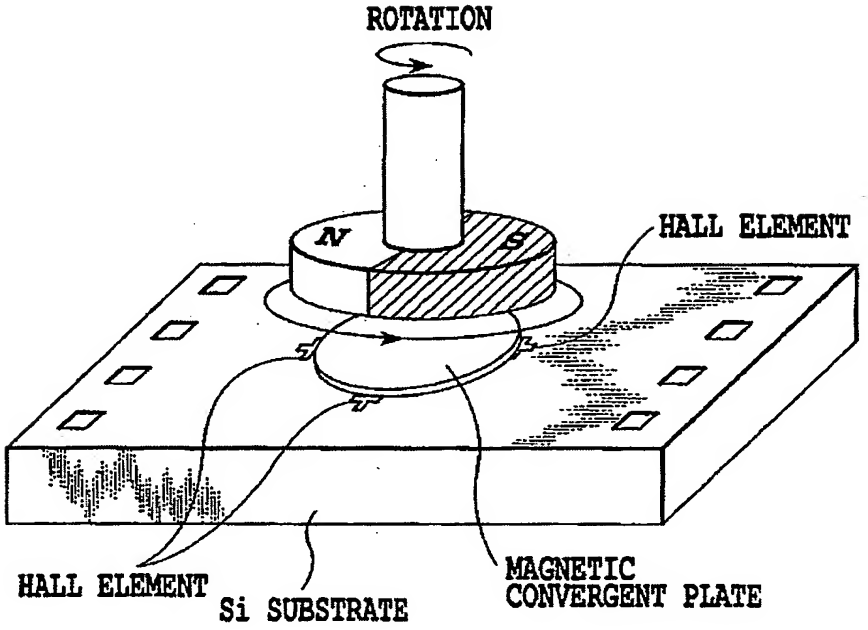


FIG.16A

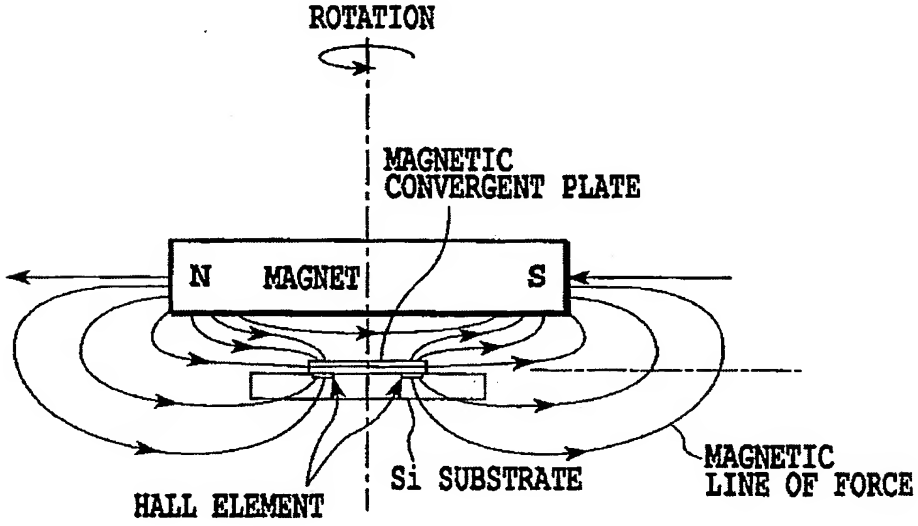


FIG.16B